



RCA Amateur Radio Club

Indianapolis, IN

www.w9rca.org



DECEMBER 2020

MONTHLY NEWSLETTER

A VIRTUAL ZOOM MEETING WILL BE SCHEDULED FOR
TUESDAY DECEMBER 8th AT 7:00 EST
INVITATIONS TO JOIN WILL BE EMAILED BY DECEMBER 7th

RCA ARC NEWS

THE DECEMBER 8th MEETING – For the December 8th meeting, we shall again use a Zoom virtual meeting. The meeting will start at 7:00 pm and is being hosted on the Indiana ARRL Section Zoom courtesy of the Indiana SCM Jimmy Merry, KC9RPX.

You will receive an email message with a link, meeting ID and password by December 7th. If you can access your emails by your smart phone, then you can join using it. If you join using your desktop or laptop and do not have a video camera, then it will join you with audio only assuming you have some type of microphone connected to the computer. If not, then you will be logged as listen only. You can also use your phone and call in using the numbers listed in the email for the session.

NOVEMBER MEETING SUMMARY – Thanks to all those who participated in the October Zoom meeting. The proposed FCC fee of \$50 for an amateur license was discussed. ARRL is asking everyone to file comments and Jim, K9RU did file comment for the club.

We did receive a quote for the ARRL Club insurance and after comparing them with the present company, Mercer Insurance, voted to stay with Mercer for another year. We have received the premium notice and Gregg will send the check to K9RU for the payment. There were several changes to the policy, most related to the insurance does not cover liability for COVID-19 cases. It is not due till January

A round table discussion on pluses and minuses of various ham antennas and installations. This was the main a topic of discussion. We can thank Nathan, KD9QHF for his questions and the interesting topic for the meeting..

With the rise in COVID-19 cases, in-person meetings will probably not be possible for several more months. We had two new visitors (new members): Nathan, KD9QHF and Keith K9JKJ. Welcome!

AMATEUR RADIO LICENSE TEST SESSION

Time: Saturday, December 12, 2020, Starting at 12:00 pm **by appointment only.**
(Registration, FRN, form NCVFC 605 filled out and a mask. All will be required)
Location: Salvation Army EDS Training Facility, 4020 Georgetown Rd
Indianapolis, IN 46254-2407
Contact: Jim Rinehart, k9ru@arrrl.net, 317 721-1458

HAMFESTS, OPERATING EVENTS, VOLUNTEER OPPORTUNITIES

Dec 4-6 ARRL 160M contest
Dec 12-13 ARRL 10M Contest
Jan 1 ARRL Straight Key Night

POWERFUL SOLAR FLARE, CORONAL MASS EJECTION OCCUR ON NOV. 29

A solar flare from massive solar region 2786 at 1311 UTC on Sunday, November 29, was the most powerful solar flare and coronal mass ejection (CME) so far during the new Solar Cycle 25.

The sun's activity is now rapidly increasing after a slow increase in activity this year following solar minimum a year ago.

While the flare and CME, which erupted from just behind the southeast solar limb, was *not* Earth directed, the shock enhancement/glancing blow from the CME may cause disruption to active geomagnetic conditions November 30 – December 2 (10%, 35%, and 35%, respectively, according to the Space Weather Prediction Center). There is a chance for additional M-class solar flares through December 2, and a slight chance for much stronger X-class flares. --ARRL

ARECIBO OBSERVATORY INSTRUMENT PLATFORM FALLS INTO ICONIC DISH

[Checkout this YouTube video by Scott Manley on Arecibo:

<https://www.youtube.com/watch?v=IEe4Wlc5Vp0>

And, after the collapse of the structure on Dec.1 :

<https://www.youtube.com/watch?v=vchDbyIRP44>]

The 900-ton instrument platform of the 305-meter radio telescope at Arecibo Observatory in Puerto Rico fell some 400 feet Tuesday morning, crashing into the huge, already-damaged dish below, the National Science Foundation (NSF) reported in a December 1 Tweet. "No injuries were reported," NSF said, adding that it is still assessing the situation. "Our top priority is maintaining safety." The calamity not only was a final and fatal blow for the observatory but for the people of Puerto Rico.

Head of Telescope Operations Angel Vazquez, WP3R, is quoted in a *Primera Hora* report that he was working in the Observatory's control room at the time, salvaging important instruments. "There was a large noise heard outside the control room," he said. "When we looked outside, we could see that the [instrument] platform began to fall slowly from the three [support] towers. The azimuth...the arm below the triangle...that detached from the triangle, fell a little outside the center of the plate and the rest of the platform, in 30 seconds, fell off on the plate to the north side."

The towers supported the massive instrument platform, which was suspended on cables above the dish. On August 10, an auxiliary cable that helped to support the platform snapped and fell,

causing a 100-foot gash in the reflector dish. After an extensive evaluation, NSF announced on November 19 that the damaged radio telescope — in service for nearly 60 years — was beyond repair and would be decommissioned due to safety concerns. Arecibo, which, among other accomplishments had contributed to the observation of black holes, was the second-largest radio telescope in the world.

The iconic dish has served as a backdrop for several science fiction movies. The Arecibo Observatory Amateur Radio Club, KP4AO, is headquartered at the research facility, and several other radio amateurs are employed there in addition to Vazquez. Operations at the world-famous observatory have been managed by the University of Central Florida (UCF).

Engineers were ready to implement emergency structural stabilization of the auxiliary cable system, but while arranging delivery of two replacement cables and two temporary cables, a main cable broke on the same tower on November 6. Based on the stresses borne by the second broken cable, engineers concluded that the remaining cables were likely weaker than originally projected.

Antenna designer and electrical engineer Jim Breakall, WA3FET, who conducted research at the world-famous facility over more than 45 years, told ARRL that his experience with Arecibo began in 1974 when he was a student, and he worked on the first HF ionospheric heating design and calibration of the dish for ionospheric research. He also conducted amateur radio moonbounce experiments there. Later, he designed feeds for radio astronomy and designed and built the HF ionosphere modification facility that fed the dish with a dipole array at the bottom of the huge dish, after Hurricane Georges destroyed the first HF facility some 10 miles away in 1998.

"I built a super contest station on my farm there about 2 miles away using Angel's call sign, WP3R. It got destroyed in Hurricane Maria in 2017," Breakall recounted. "I also was on the team for KP4AO in 2010 for EME [moonbounce] and my photo was on the cover of QST with Joe Taylor, K1JT."

"I was prepared for this, but still never wanted to hear it," Breakall told ARRL. "It is like losing a loved one when you know they are dying. Wow. Who would have ever believed it."

NSF said it was saddened by the latest development regarding the aging radio telescope. "As we move forward, we will be looking for ways to assist the scientific community and maintain our strong relationship with the people of Puerto Rico."

UNIVERSAL RADIO ANNOUNCES CLOSING

Ham Radio retailer Universal Radio, headquartered in Worthington, Ohio, is closing its store on November 30, although all existing orders will be filled, and the Universal Radio website will remain open to sell off "remaining stock, publications, and some select products." Owners Fred Osterman, N8EKU, and Barbara Osterman, KC8VWI, are retiring.

"I am very fortunate to have been in the radio business for over 50 years, 13 at RadioShack and 37 at Universal Radio," Fred Osterman said in a message of gratitude to its patrons. "We have met many wonderful people along the journey who have supported me personally as well as Universal Radio. It has been a privilege to have a continuous career in the fascinating field of radio since 1969."

The new mailing address for Universal Radio is 752 N State St. Unit 222, Westerville, OH 43082, telephone (614) 866-4267. (This is not a storefront.) --ARRL

FEMA SEEKING RESERVE TELECOMMUNICATIONS OPERATORS

The Federal Emergency Management Agency (FEMA) is seeking telecommunications operator reservists to assist in emergency recovery efforts on an intermittent, on-call basis. The deadline to apply is December 8, but FEMA will not take any applications beyond the first 200, which may come sooner than that.

These FEMA reservist positions seem well suited to radio amateurs. Duties include sending, receiving, and distributing HF radio messages between first responders using the phonetic alphabet, Morse code, call signs, continuous wave, and proper frequencies based on network requirements, as well as setting up, establishing, and maintaining an HF radio site in an austere environment and performing site analysis to determine an optimal location.

Among other requirements, candidates should have an understanding of radio wave propagation for day, night, and transitional period frequency use, and be able to maintain station message logs and compile communication reports.

The Reservist Program is an appointment type granted under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 306(b), which authorizes FEMA to appoint such temporary employees as necessary to accomplish work authorized under the Act. See the position description on the USAJobs website for complete information. --ARRL

ARRL ASKS FCC TO ALLOW 3.4-GHZ OPERATION UNTIL SPECTRUM IS OCCUPIED

In comments to the FCC, ARRL has argued that radio amateurs be allowed to continue shared operation in the 3.4 GHz band until 5G licensees who purchase the spectrum when the FCC puts it up for auction initiate incompatible operations. In its *Further Notice of Proposed Rulemaking (FNPRM)* in WT Docket 19-348, the FCC had proposed to sunset the band for amateur radio in two phases, governed by when new licenses are issued rather than when the new licensees begin to use the spectrum. In the *FNPRM*, the FCC solicited comments on whether alternatives exist to its proposal.

"Amateur activities further the public interest and should be permitted to continue on a secondary basis unless and until a new primary licensee is ready to occupy the spectrum in a preclusive manner," ARRL told the FCC. "At a minimum, amateur operations should be permitted to continue indefinitely in the 3.3 – 3.45 GHz spectrum, where no new flexible licenses are under immediate consideration. The Commission could consider whether a registration or other mechanism similar to that found in Section 97.303(g) would facilitate avoiding interference."

Section 97.303(g) contains specific frequency-sharing requirements for the 2200- and 630-meter amateur bands. ARRL said its comments were without prejudice to its pending *Petition for Reconsideration* of the FCC proposal to delete the amateur secondary allocation from the entire 3.3 – 3.5 MHz band.

ARRL noted that some 1,000 comments have been submitted by individual amateurs and amateur organizations at the initial stage of this proceeding. Those included one from the Emergency Communications Coordinator in the California Governor's Office of Emergency Services, who wrote: "Over the years the State of California Governor's Office of Emergency Services Public Safety Communications Tactical Communications Unit has utilized Radio Amateur Television product during fire operations to gather intel and monitor threats to communications sites being affected by fires and fire weather events... Part of the backbone of the [amateur radio television] system utilizes the 3-GHz spectrum, and due to heavy spectrum usage in the 1.2 and 5.8 GHz spectrum, the 3 GHz spectrum becomes very important for frequency diversity supporting these networks..."

As ARRL noted, “Amateurs often select the 3.4-GHz spectrum precisely because other spectrum choices are sub-optimum or simply not available. Amateurs also are only secondary users on most of the other spectrum suitable for similar purposes,” ARRL said. “Links must be carefully engineered because of that secondary status, which applies to most of the 2.4- and all of the 5.8-GHz bands available to amateurs. In many geographic areas, it is a misconception that the 3.4 GHz operations easily can be moved to other bands.”

ARRL emphasized the importance of allowing amateurs to continue to use the 3.4 – 3.45 GHz portion in particular. “As stated by commenters during the initial stage of this proceeding, some of the equipment commonly used in this band for network linking cannot be re-channelled below 3.4 GHz,” ARRL said.

ARRL pointed out that in many geographic areas it could be years before the 3 GHz spectrum is actually put into use by commercial users, and argued that amateur radio should be allowed to continue to operations on a secondary, non-interference basis as it has done for decades with federal primary users, until new uses actually begin, rather than when licenses are issued.
--ARRL

ARRL SEEKS WAIVER OF PROPOSED FCC AMATEUR APPLICATION FEES

ARRL has urged the FCC to waive its proposed \$50 amateur radio application fee. The Commission proposal was made last month in a *Notice of Proposed Rulemaking (NPRM)* in MD 20-270. The proposal already has drawn more than 3,200 individual comments overwhelmingly opposed to the plan. The fees, directed by Congress and imposed on all FCC-regulated services, are to recover the FCC’s costs of handling and processing applications.

“Amateur radio applications were not listed when the Congress adopted its 1985 fee schedule for applications, and therefore amateur license applications were excluded from the collection of fees,” ARRL said on November 16 in its formal comments on the proposal. “Similarly, a decade later when regulatory fees were authorized, the Amateur Service was excluded, except for the costs associated with issuing vanity call signs.” The new statutory provisions are similar. Amateur radio license applications are not addressed in the application fees section and explicitly excluded from regulatory fees,” ARRL said, and there is “no evidence of any intent by Congress to change the exempt status of amateur applications and instead subject them to new fees.”

ARRL argued that the FCC has explicit authority to waive the fees if it would be in the public interest, and should do so for the Amateur Radio Service. Unlike other FCC services, the Amateur Radio Service is all volunteer and largely self-governing, with examination preparation, administration, and grading handled by volunteers, who submit licensing paperwork to the FCC, ARRL pointed out.

“Increasingly, the required information is uploaded to the Commission’s database, further freeing personnel from licensing paperwork as well as [from] day-to-day examination processes,” ARRL said. “The addition of an application fee will greatly increase the complexity and requirements for volunteer examiners.”

The Communications Act, ARRL noted, also permits the FCC to accept the volunteer services of individual radio amateurs and organizations in monitoring for rules violations. In 2019, ARRL and the FCC signed a memorandum of understanding to renew and enhance the ARRL’s Volunteer Monitor program, relieving the Commission of significant time-consuming aspects of enforcement.

These volunteer services lessen the regulatory burden — including the application burden — on the Commission’s resources and budget in ways that licensees in other services do not, ARRL said.

Amateur radio's role in providing emergency and disaster communication, education, and other volunteer services also justifies exempting radio amateurs from FCC application fees. For example, ARRL noted, last year more than 31,000 participated as members of the ARRL Amateur Radio Emergency Service (ARES), and local ARES teams reported taking part in more than 37,000 events, donating nearly 573,000 volunteer hours, providing a total value of more than \$14.5 million.

Amateur radio also has motivated many students to develop critical science, technology, engineering, and mathematics (STEM) skills. ARRL noted that the Amateur Radio Service contributes to the advancement of the radio art, advances skills in communication and technology, and expands the existing reservoir of trained operators, technicians, and electronics experts — all expressed bases and purposes of the Amateur Radio Service.

"Accomplishing these purposes entails working with young people, many of whom may have difficulty paying the proposed application fees of \$50, \$100, or \$150," ARRL said. "The \$150 fee would be the cost of passing the examinations for the three amateur license levels in three examination sessions," ARRL said. "Such multiple application fees to upgrade would dampen the incentive to study and demonstrate the greater proficiency needed to pass the examinations for the higher amateur classes."

ARRL concluded that the FCC should exercise its authority to exempt amateur radio from application fees generally. If the FCC cannot see its way clear to waive fees for all amateur radio license applications, the fees should be waived for applicants age 26 years and younger. Such individuals, ARRL contended, have the most to contribute to the future of radio technology and other STEM-related activities and are the most likely to find the proposed application fees burdensome. --ARRL

YASME FOUNDATION ANNOUNCES EXCELLENCE AWARDS

The Yasme Foundation has announced the latest recipients of the Yasme Excellence Award. They are Brett Ruiz, PJ2BR, and Helena Ruiz, PJ2ZZ; Bob Wilson, N6TV; Jari Perkiömäki, OH6BG, and Jim Brown, K9YC. The Yasme Excellence Award recognizes individuals and groups who, through their own service, creativity, effort, and dedication, have made a significant contribution to amateur radio. This may be a technical, operating, or organizational achievement.

Brett and Helena Ruiz have been active leaders of the VERONA Radio Club, Curaçao's International Amateur Radio Union (IARU) member-society, for more than 20 years. Their participation has included technical activities, disaster preparedness and relief, and training of potential radio amateurs. They serve as liaisons to government and international organizations, and contribute to important events, such as the Global Amateur Radio Emergency Communications Conference (GAREC) and IARU conferences and meetings. Brett Ruiz is also active in long-distance VHF propagation and digital communication.

Yasme recognized Bob Wilson, N6TV, for his technical support to hundreds of hams through various radio manufacturers' user groups and logging software communities, and for assistance to Reverse Beacon Network (RBN) hosts in keeping their equipment configured and running. He also provides invaluable support to traveling hams worldwide. "Along with being technically talented, he is exceptionally selfless in using that talent to help others; quick to encourage others in many areas," the Yasme Foundation said in announcing the awards.

Jari Perkiömäki, OH6BG, has volunteered to support the online VOACAP software and website for nearly 20 years, making world-class HF propagation prediction and modeling services available to any radio amateur. "He believes in teamwork, acknowledging the contributions and ideas from the ham community for further development of the service, but especially from James

Watson, M0DNS/HZ1JW, and Juho Juopperi, OH8GLV,” Yasme said. Perkiömäki estimates that VOACAPonline serves thousands of users from more than 100 countries every month, including integration with the DX Summit and Club Log services. He is part of the Radio Arcala, OH8X, team and acts as a propagation specialist, assisting the World Radiosport Team Championship (WRTC) community, the Radio Society of Great Britain (RSGB), and others.

Jim Brown, K9YC, was cited for his extensive contribution to amateur radio regarding ferrite materials and their use in combating RF interference, feed-line applications, and transformers. “His efforts to improve transmitter performance and operating practices are also greatly appreciated, as are the extensive set of personal publications available to the public and performing reviews of technical material for amateur radio publishers,” Yasme said.

The Yasme Excellence Award is in the form of a cash grant and an individually engraved crystal globe. --ARRL

DAYTON HAMVENTION ANNOUNCES ITS 2021 THEME — “THE GATHERING”

“The Gathering” will be the theme for the 2021 Dayton Hamvention®. Hamvention General Chair Rick Allnutt, WS8G, said the theme reflects what has been missing from our lives most of this year.

“We have spent the last 6 months being bound to our houses and small groups,” he said. “We are very optimistic that when May arrives, we will be allowed to get together.”

Allnutt, a medical doctor with a master’s degree in public health, said Hamvention management is closely following the coronavirus situation and believes it will improve enough by May that government restrictions on travel and large groups will be relaxed. The Hamvention team will continue to follow developments.

“We hope we will all be able to get together, talk about ham radio, and share the interaction we have missed,” Allnutt said. “The Gathering” theme acknowledges the role that Hamvention plays in amateur radio.

Hamvention 2021 will be held May 21 – 23 at the Greene County Fairgrounds and Expo Center in Xenia, Ohio. --ARRL

NEUTRON-1 CUBESAT DEPLOYED FROM ISS; OTHER SATS PENDING

The [Neutron-1 3U CubeSat](#) was deployed from the International Space Station (ISS) on November 5 at 10:40 UTC. For the satellite’s first month and during its commissioning phase, the Neutron-1 beacon will transmit 1,200 bps BPSK [telemetry](#) every 60 seconds on 435.300 MHz. Developed by the Hawaii Space Flight Laboratory (HSFL) at the University of Hawaii at Manoa (UHM), the satellite’s payload includes a VU FM amateur radio repeater during available times and according to the spacecraft’s power budget. The Neutron-1 science mission is spelled out in a [formal paper](#), *Neutron-1 Mission: Low Earth Orbit Neutron Flux Detection and COSMOS Mission Operations Technology Demonstration*.

HSFL operates and maintains a satellite UHF, VHF, and L/S-band amateur radio ground station at Kauai Community College.

The primary mission of Neutron-1 is to measure low-energy neutron flux in low-Earth orbit (LEO). The science payload, a small neutron detector developed by Arizona State University, will focus

on measurements of low-energy secondary neutrons -- a component of the LEO neutron environment.

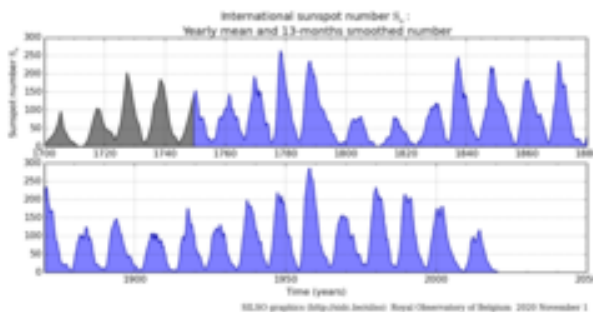
A number of other amateur radio satellites are expected to launch or be deployed in the next few months. AMSAT's RadFxSat-2 (Fox-1E) is expected to go into orbit by year's end on Virgin Orbit's LauncherOne vehicle. RadFxSat-2 carries a 30 kHz wide VU linear transponder.

The Tevel Mission -- a series of eight Israeli 1U CubeSats, each carrying a UV FM transponder -- is expected to launch from India on a SpaceX Falcon 9 rocket in December. Also from the Herzliya Science Center is a 3U CubeSat called Tausat-1, which is scheduled to launch on a Japan Aerospace Exploration Agency (JAXA) ISS resupply mission in February for subsequent deployment. Tausat-1 carries an FM transponder.

AMSAT-Spain ([AMSAT-EA](#)) reports that its PocketQubes, EASAT-2 and HADES, have been integrated for launch on a SpaceX Falcon 9 in December, while GENESIS-L and GENESIS-N have been integrated for launch on Firefly's Alpha rocket. Read [more](#). -- Thanks to *AMSAT News Service* --ARRL

ACADEMIC PAPER PREDICTS SUNSPOT CYCLE 25 COULD BE AMONG THE STRONGEST EVER

A [research paper](#), "Overlapping Magnetic Activity Cycles and the Sunspot Number: Forecasting Sunspot Cycle 25 Amplitude," by Scott W. McIntosh, Deputy Director of the National Center for Atmospheric Research in Boulder, et al., has concluded that Solar Cycle 25 could be among the strongest sunspot cycles ever observed, and will almost certainly be stronger than the just-ended Solar Cycle 24 (sunspot number of 116). The scientists say it will also most likely be stronger than Solar Cycle 23 (sunspot number of 180). As the abstract explains:



Sunspot cycle graph dating to 1700. [SILSO Graphic]

"The sun exhibits a well-observed modulation in the number of spots on its disk over a period of about 11 years. From the dawn of modern observational astronomy, sunspots have presented a challenge to understanding -- their quasi-periodic variation in number, first noted 175 years ago, stimulates community-wide interest to this day. A large number of techniques are able to explain the temporal landmarks, (geometric) shape, and amplitude of sunspot 'cycles;' however, forecasting these features accurately in

advance remains elusive.

"Recent observationally motivated studies have illustrated a relationship between the sun's 22-year magnetic cycle and the production of the sunspot cycle landmarks and patterns, but not the amplitude of the sunspot cycle. Using (discrete) Hilbert transforms on more than 270 years of (monthly) sunspot numbers, we robustly identify the so-called 'termination' events that mark the end of the previous 11-year sunspot cycle, the enhancement/acceleration of the present cycle, and the end of 22-year magnetic activity cycles. Using these, we extract a relationship between the temporal spacing of terminators and the magnitude of sunspot cycles.

"Given this relationship and our prediction of a terminator event in 2020, we deduce that Sunspot Cycle 25 could have a magnitude that rivals the top few since records began. This outcome would be in stark contrast to the community consensus estimate of Sunspot Cycle 25 magnitude."

McIntosh's [recorded presentation](#) of the paper is available. Use passcode **z7qCn@3G**. --ARRL

DECEMBER IS YOTA MONTH

The month of December has been designated as YOTA month. The annual initiative sponsored by Youngsters on the Air (YOTA) initially focused on International Amateur Radio Union (IARU) Region 1 (Europe, the Mideast, and Africa), with young radio amateurs taking to the air with YOTA-suffix call signs. YOTA (Youth on the Air) in Region 2 (the Americas) is following step, and K8Y, K8O, K8T, and K8A will be on the air from the US.

The overarching idea is to demonstrate amateur radio to youth to encourage them to get licensed and for younger radio amateurs to get active on the ham bands.

YOTA-suffix stations have been on the air from the annual summer camp and other subregional camps in Region 1, but the COVID-19 pandemic sidelined those gatherings in 2020.

All radio amateurs can support this effort by contacting participating stations. An awards program is available. During YOTA month 2019, 47 participating YOTA stations racked up nearly 130,000 contacts. Follow YOTA via Twitter: [@hamyota](#) and [@hamyota_official](#). All young radio amateurs (up to age 26) are encouraged to participate. Direct questions via email to info@ham-yota.com. --ARRL

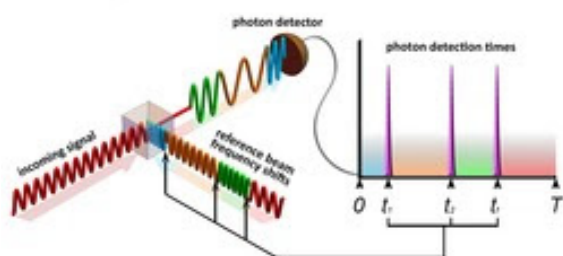
TECHNICAL

Jim, K9YC, publishes and updates his document "[A Ham's Guide to RFI, Ferrites, Baluns, and Audio Interfacing](#)" on his website. On page 23, he discusses the use of common mode chokes to reduce or eliminate common mode noise from portable generators, like the kind that DXpeditions or Field Day-style contest operations use. If you're thinking of going portable to get away from "city" RFI, be sure to verify you aren't also bringing noise sources with you.

Steve, VE6WZ, made a [video on how he constructed a band-stop filter](#) to minimize interference to broadcast band reception while he was transmitting on 160 meters. He walks through calculating the values for circuit components using an online tool from WA4DSY, selecting a filter design, and then construction of the circuit. He finishes up using a nanoVNA with *nanoSaver* software to characterize his build. --ARRL

New NIST System Detects Ultra-Faint Signals Using Quantum Physics Principles

Researchers at the National Institute of Standards and Technology ([NIST](#)) have devised and demonstrated a system that could dramatically increase the performance of communication networks while enabling record-low error rates in detecting even the faintest of signals. This has the potential to cut the total amount of energy required for state-of-the-art networks by a factor of 10 to 100. The proof-of-principle system consists of a novel receiver and corresponding signal-processing technique, entirely based on the



The incoming signal (red, lower left) proceeds through a beam splitter to the photon detector, which has an attached time register (top right). The receiver sends the reference beam to the beam splitter to cancel the incoming pulse, so that no light is detected. The receiver uses exact times of photon detection. The combination of recorded detection times and the history of reference beam frequencies is used to find the frequency of the incoming signal.

properties of quantum physics and able to handle extremely weak signals with pulses that carry many bits of data.

"We built the communication test bed using off-the-shelf components to demonstrate that quantum-measurement-enabled communication can potentially be scaled up for widespread commercial use," said Ivan Burenkov, a physicist at the [Joint Quantum Institute](#), a research partnership between NIST and the University of Maryland. Burenkov and his colleagues reported the results in [Physical Review X Quantum](#).

"Our effort shows that quantum measurements offer valuable, heretofore unforeseen advantages for telecommunications leading to revolutionary improvements in channel bandwidth and energy efficiency," Burenkov added.

Modern communications systems work by converting information into a laser-generated stream of digital light pulses in which information is encoded -- in the form of changes to the properties of the light waves -- for transfer and then decoded when it reaches the receiver. The train of pulses grows fainter as it travels along transmission channels, and conventional electronic technology for receiving and decoding data has reached the limit of its ability to precisely detect the information in such attenuated signals.

The signal pulse can dwindle until it is as weak as a few photons -- or even less than one on average. At that point, inevitable random quantum fluctuations, called "shot noise," make accurate reception impossible by normal ("classical," as opposed to quantum) technology because the uncertainty caused by the noise makes up such a large part of the diminished signal. As a result, existing systems must amplify the signals repeatedly along the transmission line, at considerable energy cost, keeping them strong enough to detect reliably.

The NIST team's system can eliminate the need for amplifiers because it can reliably process even extremely feeble signal pulses: "The total energy required to transmit one bit becomes a fundamental factor hindering the development of networks," said Sergey Polyakov, senior scientist on the NIST team. "The goal is to reduce the sum of energy required by lasers, amplifiers, detectors, and support equipment to reliably transmit information over longer distances. --ARRL

SHORTS

FCC CHAIRMAN AJIT PAI DEPARTING COMMISSION FCC Chairman Ajit Pai has announced that he intends to leave the Commission on January 20, 2021, as the Biden Administration comes into office. The FCC chairman is appointed by the president.

"It has been the honor of a lifetime to serve at the Federal Communications Commission, including as Chairman of the FCC over the past 4 years," Pai said. "I am grateful to President Trump for giving me the opportunity to lead the agency in 2017, to President Obama for appointing me as a Commissioner in 2012, and to Senate Majority Leader McConnell and the Senate for twice confirming me. To be the first Asian-American to chair the FCC has been a particular privilege. As I often say: only in America."

The FCC has five members, typically three from the party in the White House. --ARRL

Club Log has updated its [DXCC Most Wanted](#) list. The Democratic People's Republic of Korea (DPRK) -- North Korea (P5) -- still tops the list, with Bouvet Island (3Y/B), Crozet Island (FT5/W), Scarborough Reef (BS7H), and San Felix Islands (CE0X) rounding out the top five entities. --ARRL

RadioShack® is back as an online retailer of electronics, offering some parts in its inventory that largely consists of radios, batteries, telephone gear, drones, computer accessories, and even cameras. The iconic company was recently purchased from General Wireless by Retail Ecommerce Ventures (REV).

No plans are in place to reopen RadioShack-owned stores, although some 400 brick-and-mortar outlets not affiliated with REV are operated by franchisees. REV, which specializes in online retail, has previously revamped the internet presence of such bankrupt businesses as Pier 1 Imports and Dressbarn, according to a news release.

During its heyday, RadioShack has some 8,000 retail outlets and once offered some amateur radio equipment, including some popular handheld transceivers and a 10-meter transceiver.

RadioShack came out of its second bankruptcy in January 2018 with 400 dealers, an online retail presence, and a distribution center. --ARRL

IEEE Region 1 has selected Ulrich Rohde, N1UL, as the recipient of the 2020 IEEE Region 1 Technological Innovation (Industry or Government) Award. The selection was made by the Region 1 Awards and Recognition Committee and approved by the Region 1 Board of Governors. The award recognizes "pioneering research and leadership in signal processing." The Technological Innovation (Industry or Government) Award cites "significant patents, discovery of new devices, development of applications, or exemplary contributions to industry or government fitting Dr. Rohde's accomplishments in our industry." A partner of Rohde & Schwarz, Rohde has published more than 300 scientific papers and written several books and book chapters. He holds several dozen patents. --ARRL

In celebration of the 30th anniversary of the [Miller-DX-Club](#), special event stations with call signs such as R2020DX, RA30DX, RC30DX, RD30DX, RG30DX, RJ30DX, RK30DX, RL30DX, RQ30DX, RT30DX, RU30DX, RV30DX, RW30DX, RX30DX, RY30DX, and RZ30DX will be active November 16 - 29. QSL via the bureau or RQ7L.

The Israel Amateur Radio Club has announced that special call signs will be on the air during the week of Chanukah, December 10 - 19. Their one-letter suffixes spell "Chanukah" -- 4X1C, 4X2H, 4Z3A, 4X4N, 4X5U, 4X6K, 4Z7A, 4X8H, and 4X0NER ("ner" means "candle" in Hebrew). The call sign number represents the number of the candle lit that day, with one added to the menorah each day. --ARRL

Scott, N3FJP, announces: "[World Wide Digi DX Contest Log 1.0](#) is Now Available! My son Chris, KB3KCN, and I have just completed a new, separate program to support the annual [World Wide Digi DX Contest](#)! *World Wide Digi DX Contest Log 1.0* includes all the features you've come to expect in N3FJP Software including dupe checking, scoring, DX spotting, rig interface, super check partial, band map, an API, easy Cabrillo submittal, etc. Best of all, you'll likely find it very easy and intuitive to use! As always, additional programs we add to the N3FJP Software Package are free to N3FJP Software Package users. If you are a package user, please just email us directly for your [World Wide Digi DX Contest Log](#) password and Kimberly, KA3SEQ, will send yours along." --ARRL

THANKS FOR READING !

MERRY CHRISTMAS and HAPPY HOLIDAYS !

THE RCA ARC MONTHLY NEWSLETTER IS COMPILED AND EDITED BY JIM RINEHART, K9RU AND JIM KEETH, AF9A. ALL MATERIAL CONTAINED HEREIN IS OBTAINED FROM THE SOURCES CREDITED AND EDITED FOR THIS NEWSLETTER. EMAIL TO mail to: WebMaster@w9rca.org. Check our web site at <http://www.w9rca.org>
